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(54) **ANTI-RELIEF FAN FRAME BODY STRUCTURE**

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F04D 29/32	(2006.01)
F04D 29/54	(2006.01)

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CPC ***F04D 25/0613*** (2013.01); ***F04D 29/164*** (2013.01); ***F04D 29/326*** (2013.01); ***F04D 29/542*** (2013.01)

USPC **415/211.2**

(58) **Field of Classification Search**

USPC 415/182.1, 185, 186, 208.1, 208.2, 415/208.3, 211.2, 213.1, 227, 228, 168.2, 415/170.1, 171.1, 173.5, 174.5, 175

See application file for complete search history.

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(57) **ABSTRACT**

An anti-relief fan frame body structure includes a frame body and multiple anti-relief sections. The frame body has a receiving space and a shaft seat received in the receiving space. The frame body further has multiple flow guide members extending from a circumference of shaft seat to an inner circumference of the frame body to connect with the inner circumference of the frame body. The anti-relief sections are disposed on the inner circumference of the frame body between the flow guide members to increase the performance of the fan.

10 Claims, 7 Drawing Sheets

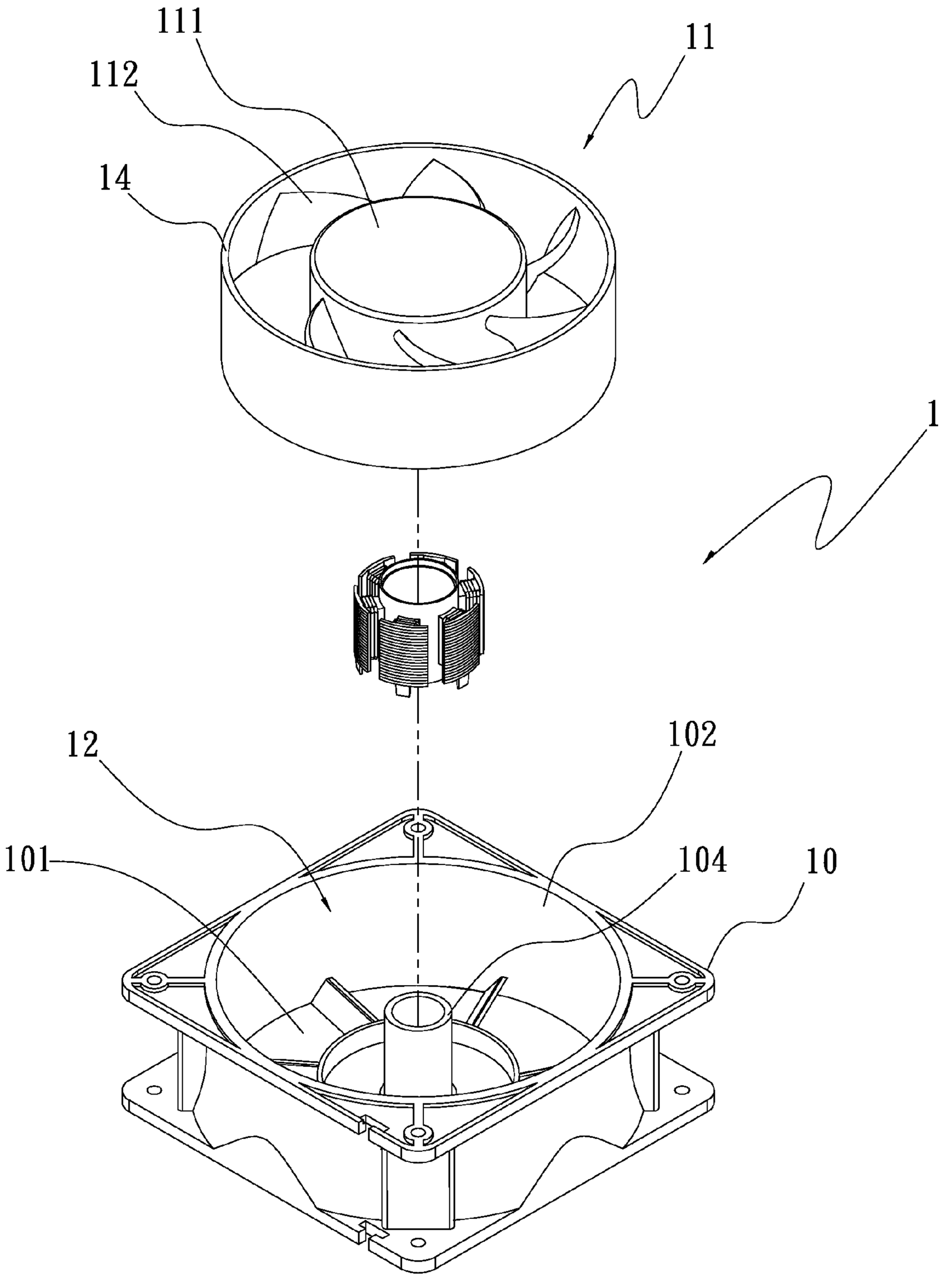


Fig. 1A(PRIOR ART)

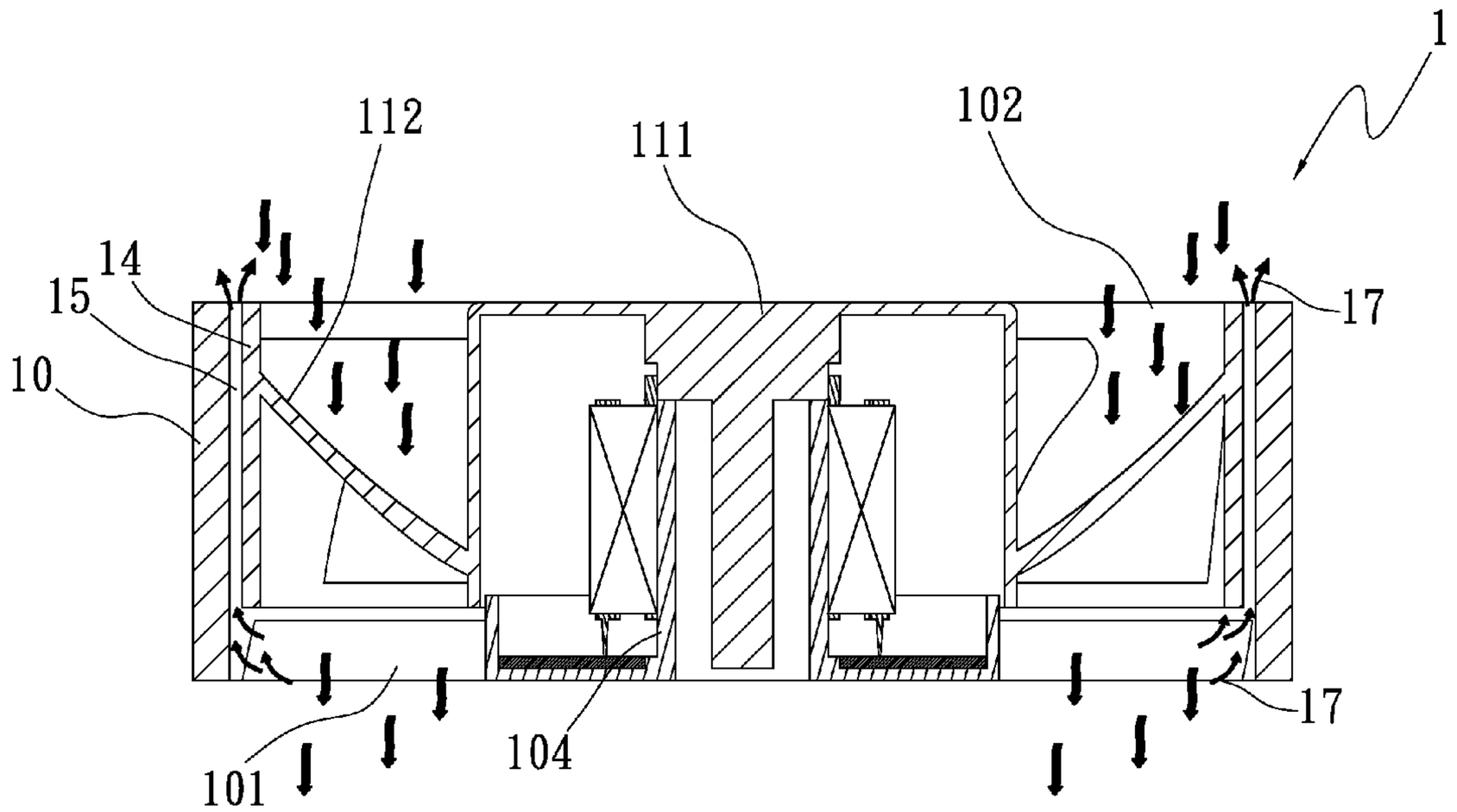


Fig. 1B(PRIOR ART)

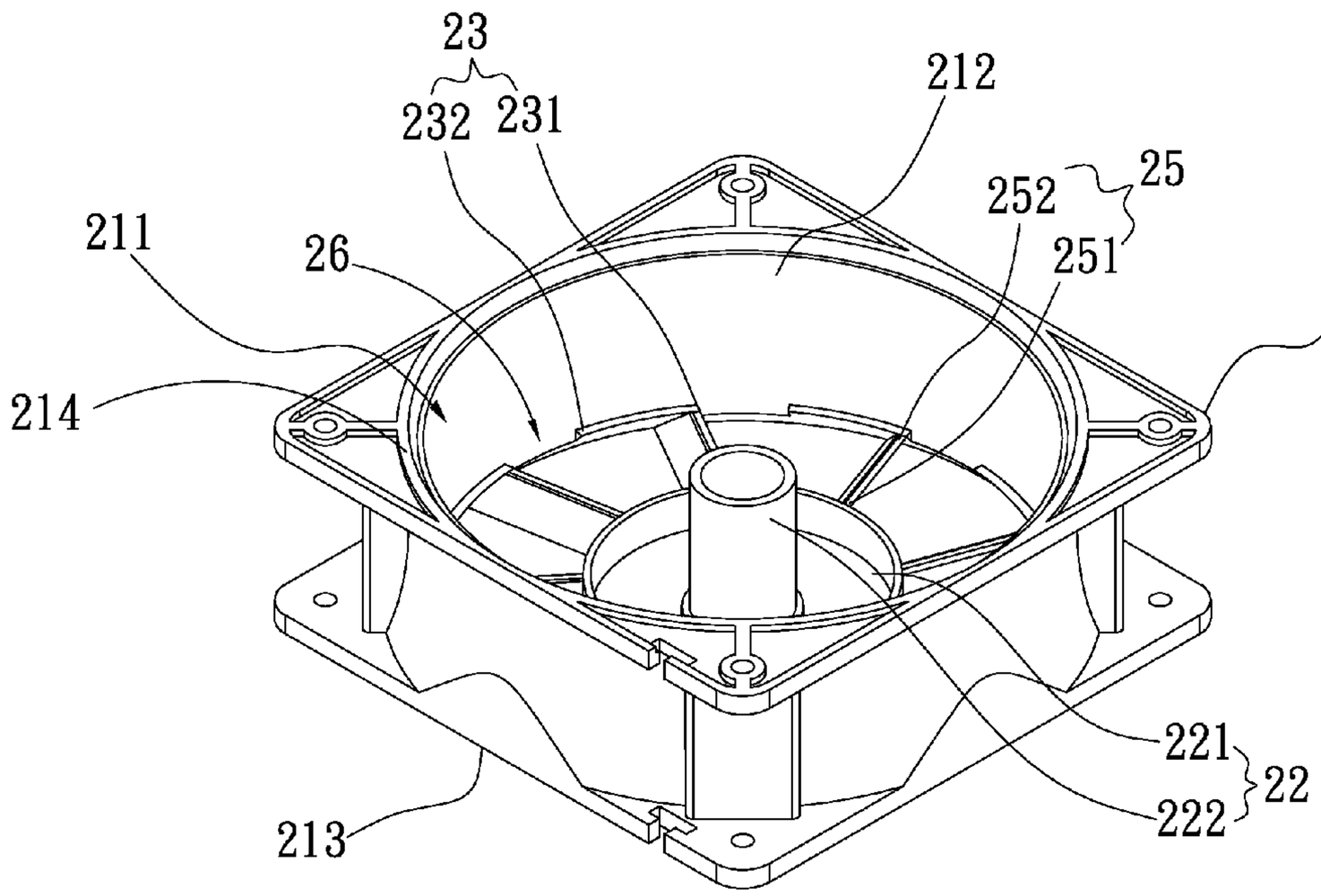


Fig. 2

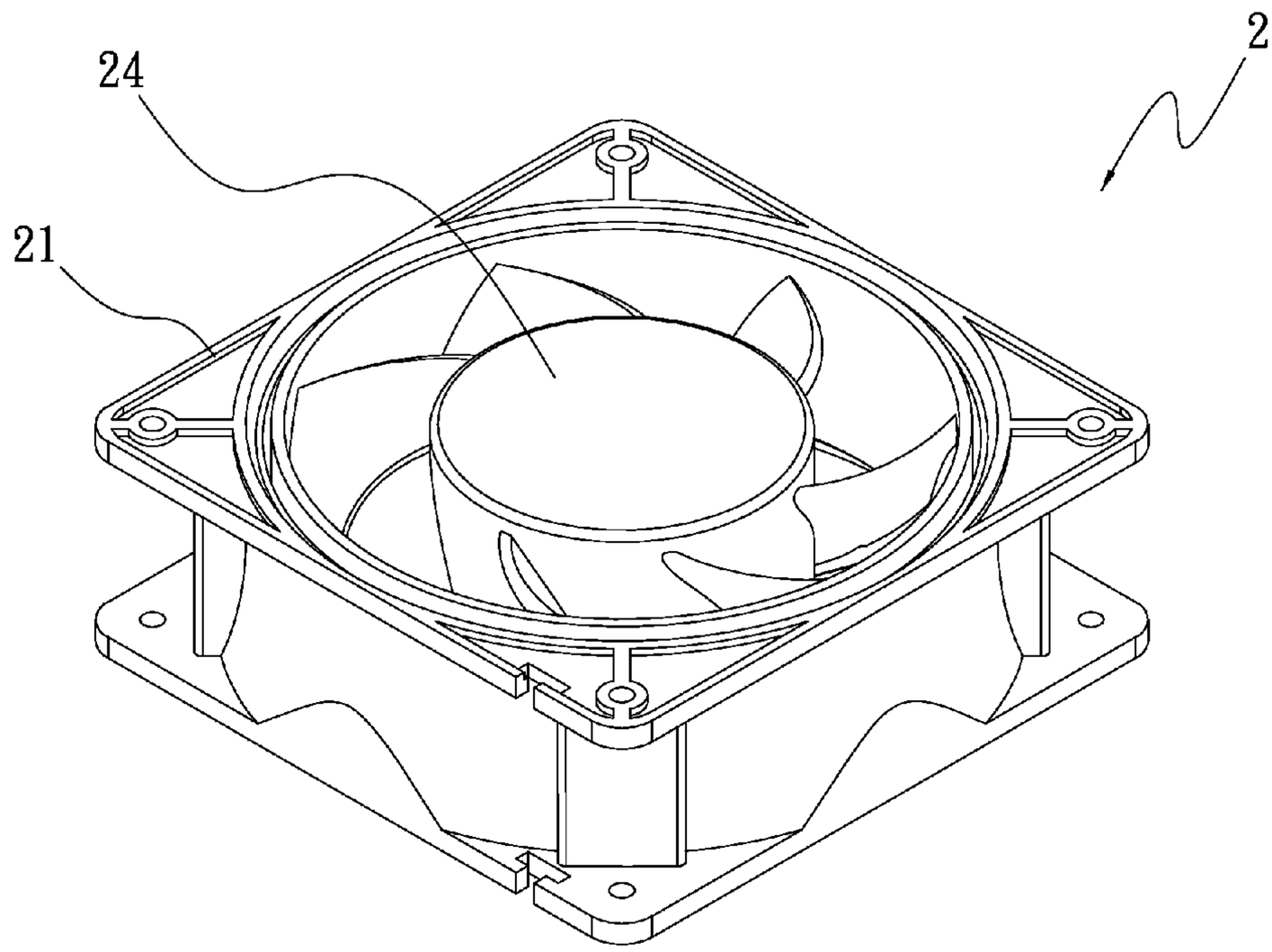

24
2
21

Fig. 3

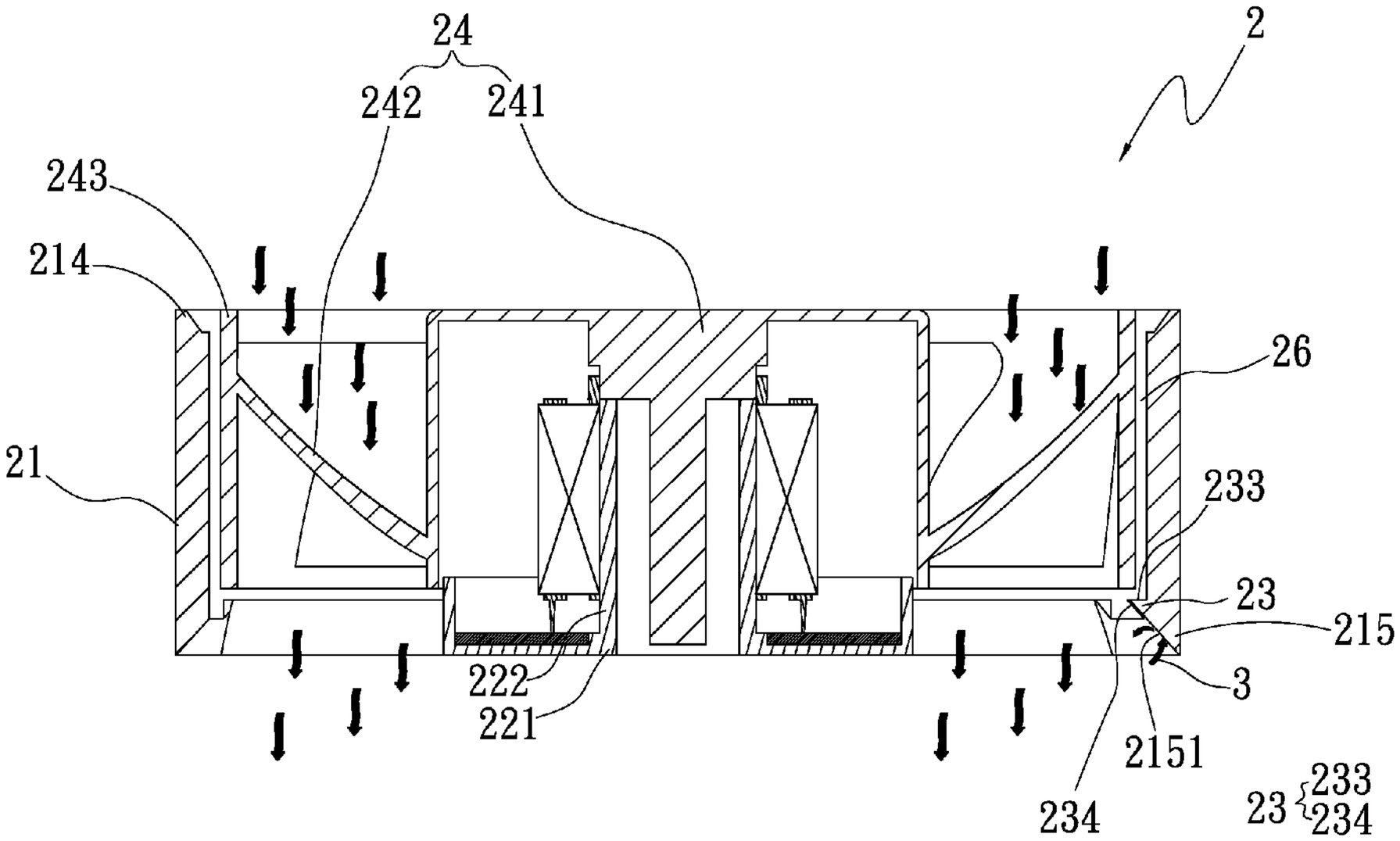

24
242
241
2
243
214
26
21
233
23
215
3
222
221
2151
234
23
233
234

Fig. 4

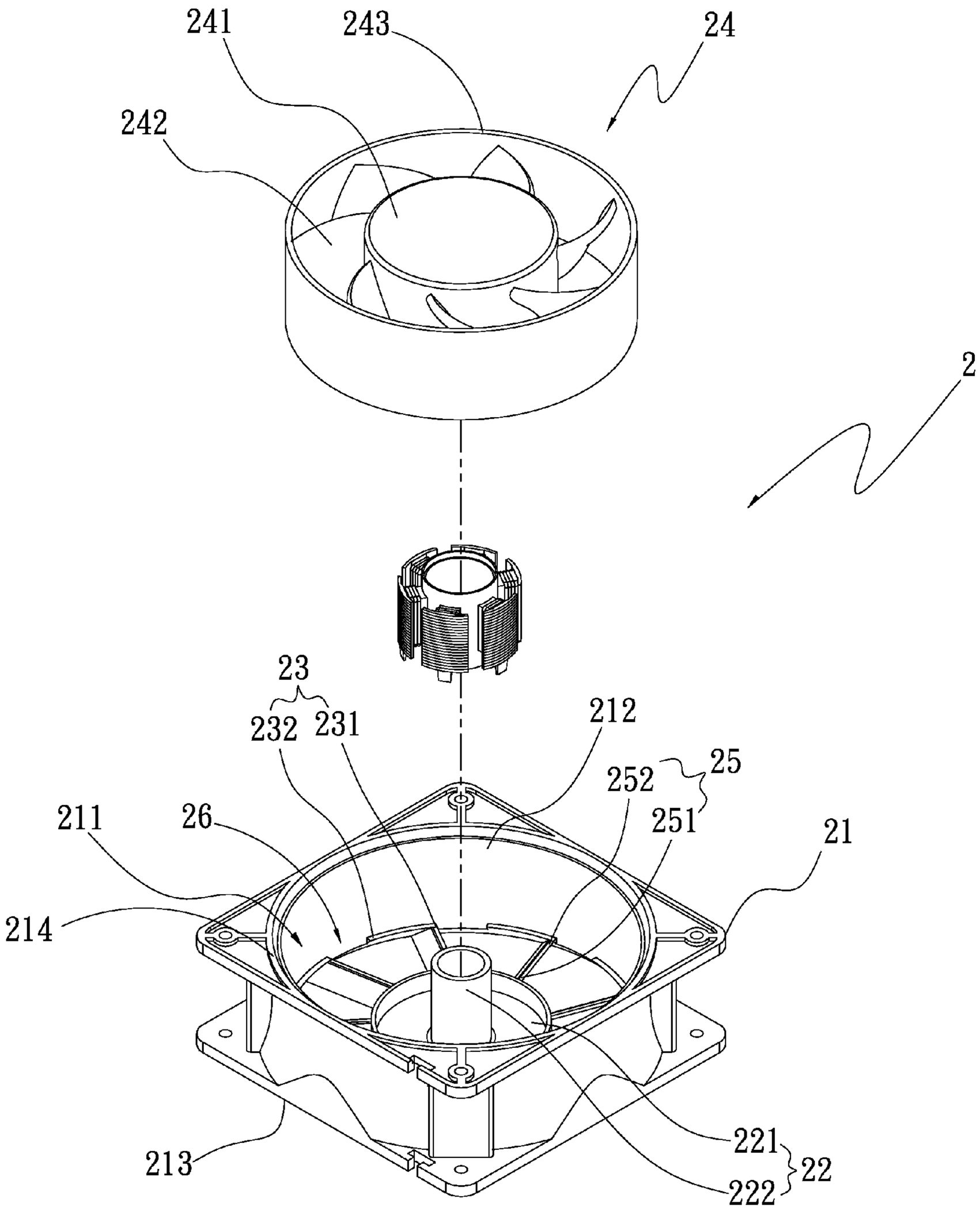

241
243
24
242
2
23
232
231
212
252
25
211
26
251
21
214
213
221
22
222

Fig. 5

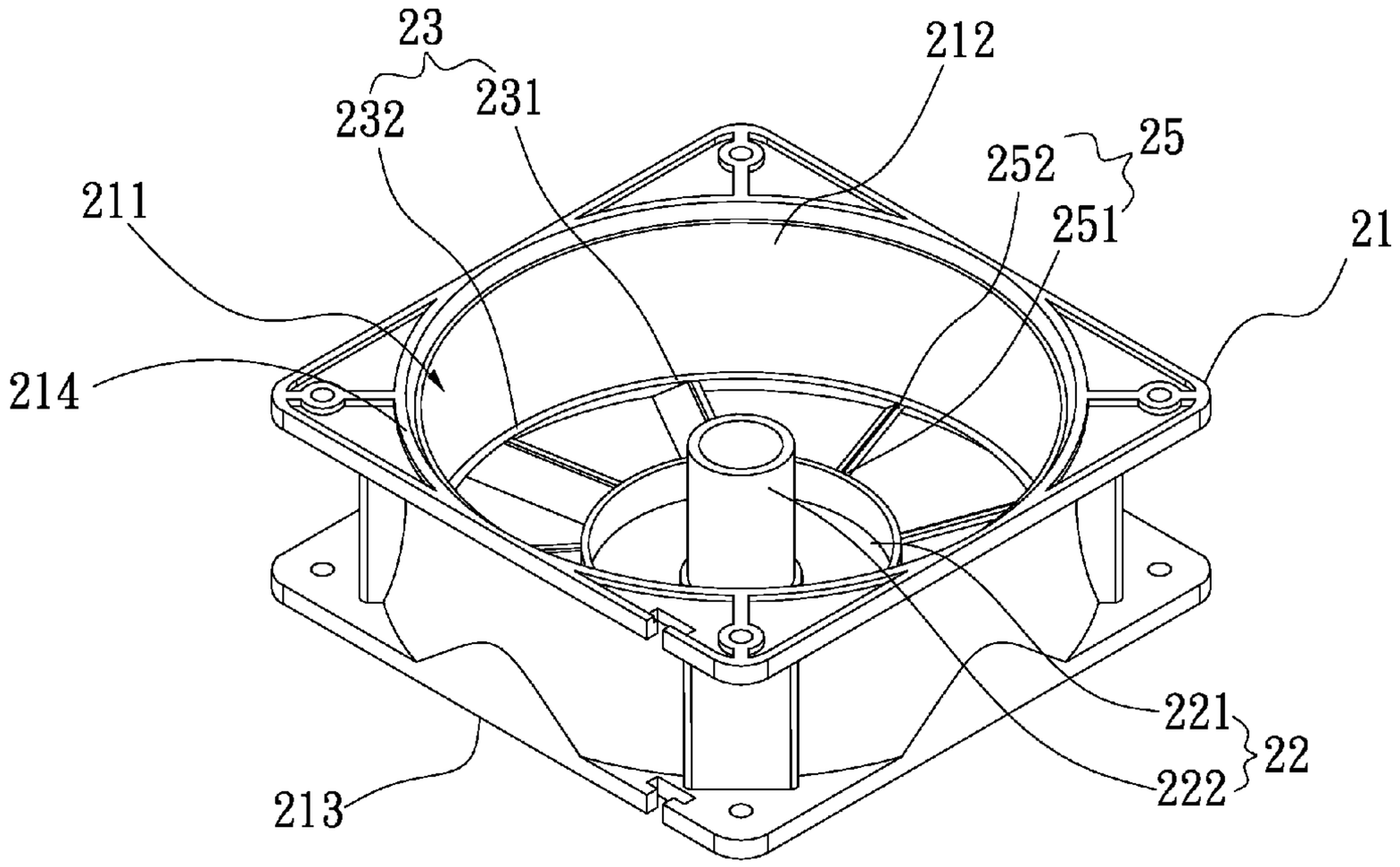

23
232
231
212
25
252
251
211
21
214
221
22
222
213

Fig. 6

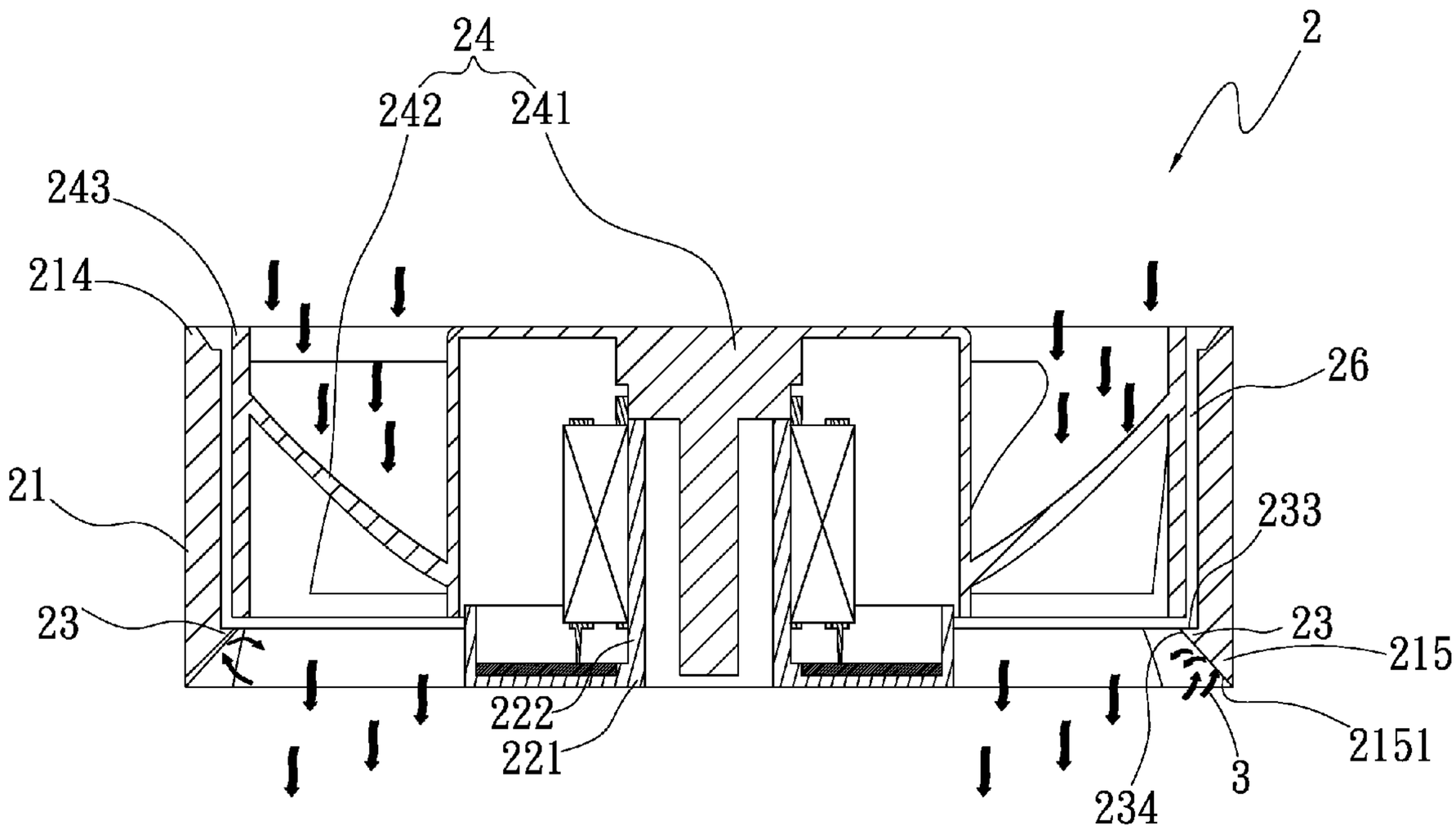
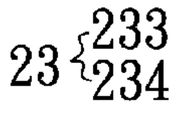

24
242
241
2
243
214
26
21
233
23
23
215
222
221
2151
3
234

Fig. 7


23
233
234

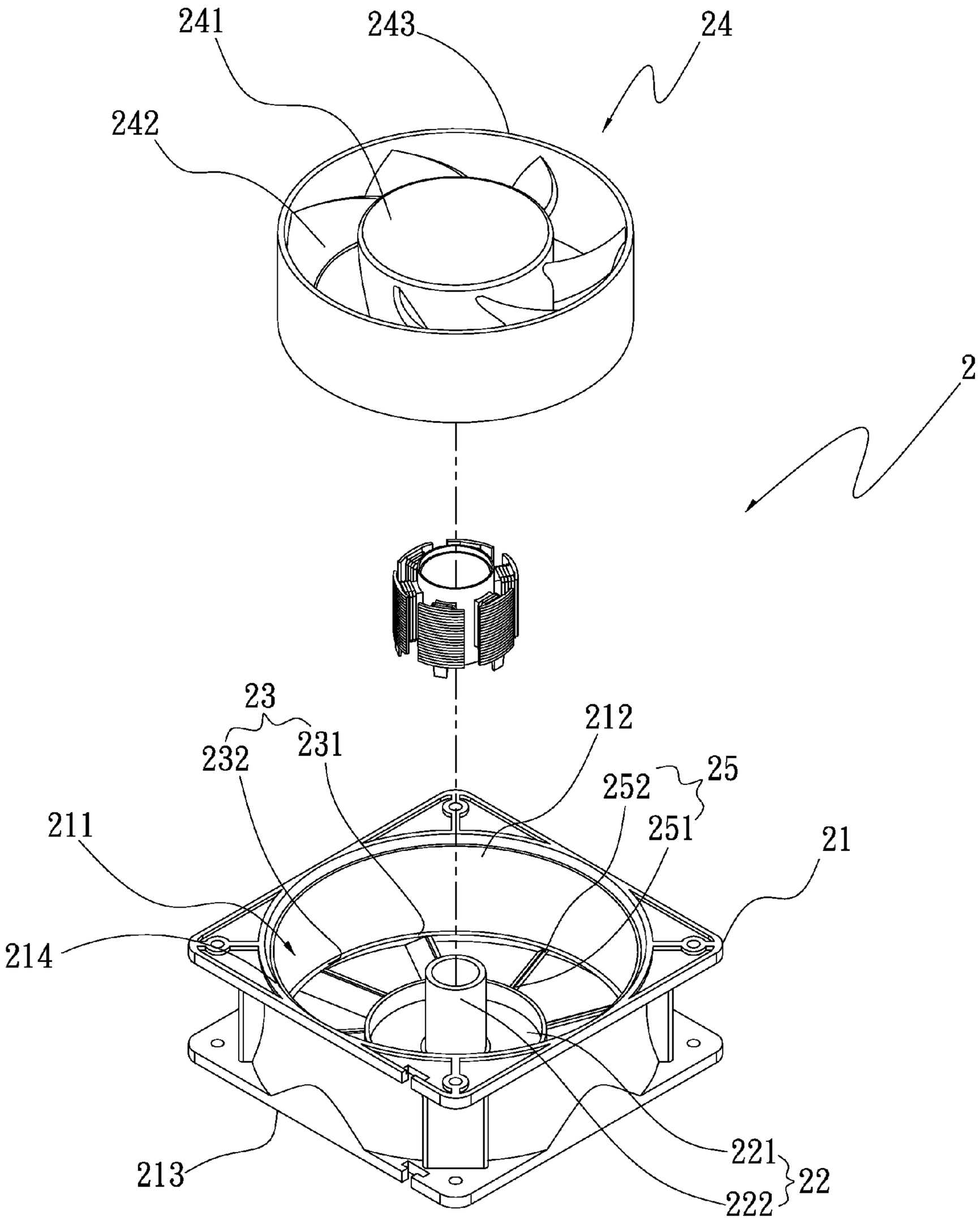

241
243
24
242
2
23
232
231
212
25
252
251
211
21
214
213
221
22
222

Fig. 8

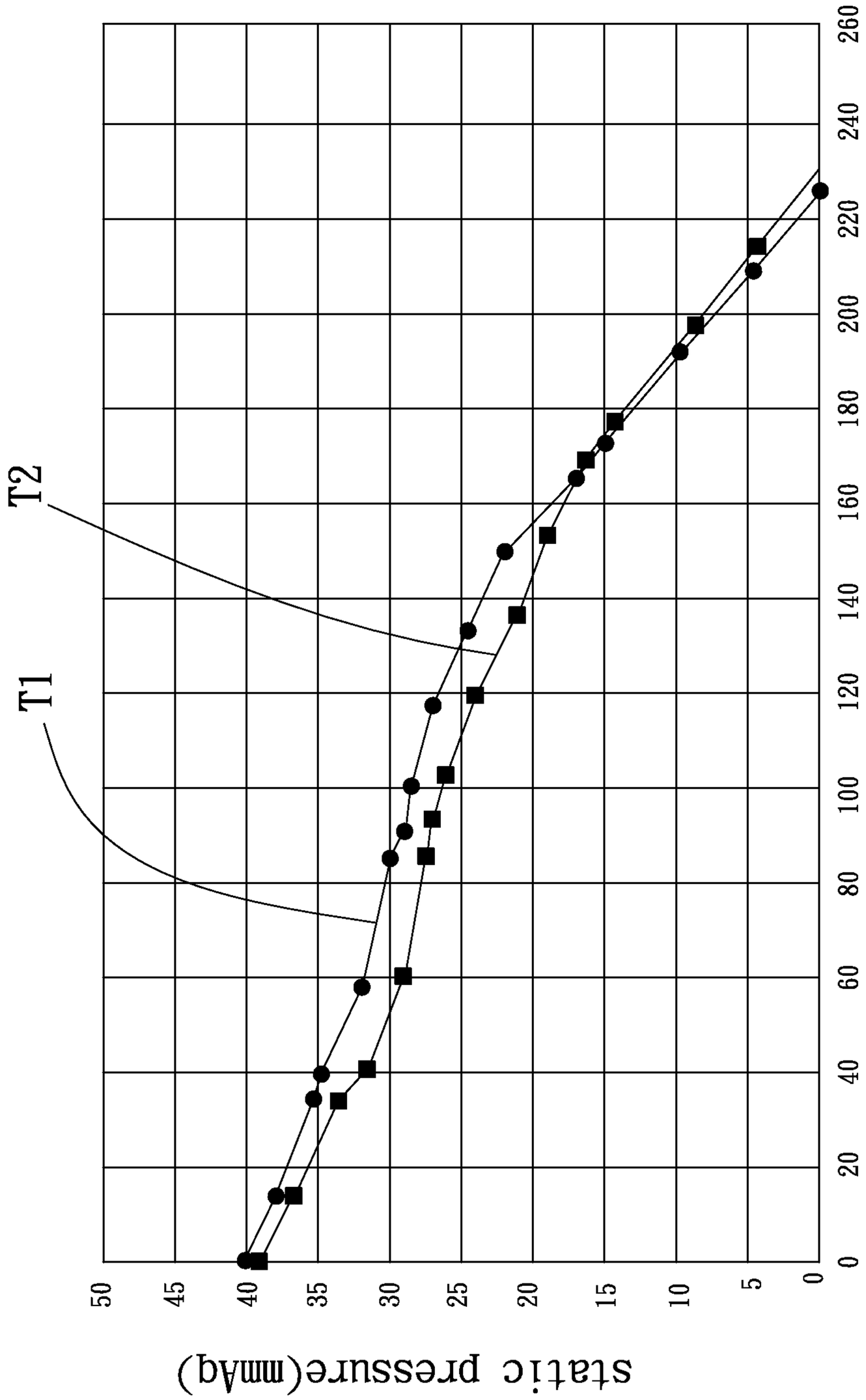

T2
T1
air volume(CFM)
static pressure(mmAq)
260
240
220
200
180
160
140
120
100
80
60
40
20
0
50
45
40
35
30
25
20
15
10
5
0

Fig.9

ANTI-RELIEF FAN FRAME BODY STRUCTURE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to a fan frame body structure, and more particularly to an anti-relief fan frame body structure, which can increase the performance of the fan.

2. Description of the Related Art

Following the rapid development of high-performance, high-frequency, high-speed and slimmed electronic products, the electronic products generate more and more heat in operation. As a result, the electronic products are likely to operate unstably. This will affect reliability of the products and shorten lifetime of the products. Therefore, it has become a critical issue how to dissipate the heat generated by the electronic products. In general, a cooling fan is often used as a heat dissipation for dissipating the heat generated by the electronic products

When a conventional cooling fan operates, eddy is often formed between the blades of the fan. The eddy will cause deterioration of the performance (such as air volume) of the fan. To solve this problem, an annular fan has been developed.

Please refer to FIGS. **1**A and **1**B. The conventional annular fan **1** includes a frame body **10** and a fan impeller **11**. The frame body **10** has a wind outlet side **101**, a wind inlet side **102** opposite to the wind outlet side **101** and a bearing cup **104**.

The wind outlet side **101** and the wind inlet side **102** together define a receiving space **12** for receiving the fan impeller **11** therein. The bearing cup **104** is positioned at a center of the receiving space **12**. The fan impeller **11** is rotatably disposed in the bearing cup **104**.

The fan impeller **11** has a hub **111** and multiple blades **112** annularly arranged along outer circumference of the hub **111**. Each blade **112** has a free end. An annular body **14** is connected to the free ends of the blades **112**. A gap **15** is defined between the annular body **14** and inner circumference of the frame body **10**. When the fan operates, the annular body **14** is able to reduce the eddy between the blades so as to increase the performance of the fan.

In the conventional annular fan **1**, the annular body **14** serves to overcome the problem of generation of the eddy. However, the annular body **14** leads to another problem. In operation of the annular fan **1**, the fluid is guided in from the wind inlet side **102** and then guided out from wind outlet side **101**. At this time, a negative pressure is created on the wind outlet side **101**. Accordingly, part of the guided out fluid **17** will flow back through the gap **15** to interfere with the guided in fluid to produce turbulence. As a result, the fluid can hardly flow smoothly. This will lead to deterioration of the performance of the fan and make great noise.

According to the above, the conventional fan has the following shortcomings:

1. The performance of the fan is deteriorated.
2. The fan will make great noise in operation.

SUMMARY OF THE INVENTION

A primary object of the present invention is to provide an anti-relief fan frame body structure, which can increase the performance of the fan.

A further object of the present invention is to provide the above anti-relief fan frame body structure, which can effectively increase air volume of the fan without changing any dynamic blade or static blade of the fan.

To achieve the above and other objects, the anti-relief fan frame body structure of the present invention includes a frame body and multiple anti-relief sections. The frame body has a receiving space and a shaft seat received in the receiving space. The frame body further has multiple flow guide members extending from a circumference of shaft seat to an inner circumference of the frame body to connect with the inner circumference of the frame body. The anti-relief sections are disposed on the inner circumference of the frame body between the flow guide members to increase the performance of the fan.

BRIEF DESCRIPTION OF THE DRAWINGS

The structure and the technical means adopted by the present invention to achieve the above and other objects can be best understood by referring to the following detailed description of the preferred embodiments and the accompanying drawings, wherein:

FIG. **1**A is a perspective exploded view of a conventional fan;

FIG. **1**B is a sectional assembled view of the conventional fan;

FIG. **2** is a perspective view of a first embodiment of the present invention;

FIG. **3** is a perspective assembled view of the fan of the present invention;

FIG. **4** is a sectional assembled view of the first embodiment of the fan of the present invention;

FIG. **5** is a perspective exploded view of the first embodiment of the fan of the present invention;

FIG. **6** is a perspective view of a second embodiment of the present invention;

FIG. **7** is a sectional assembled view of the second embodiment of the fan of the present invention;

FIG. **8** is a perspective exploded view of the second embodiment of the fan of the present invention; and

FIG. **9** is a comparison diagram between performance curve of the present invention and performance curve of the conventional fan.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Please refer to FIGS. **2**, **3** and **4**. FIG. **2** is a perspective view of a first embodiment of the present invention. FIG. **3** is a perspective assembled view of the fan of the present invention. FIG. **4** is a sectional assembled view of the first embodiment of the fan of the present invention. According to the first embodiment, the anti-relief fan frame body structure of the present invention includes a frame body **21** and multiple anti-relief sections **23**. The frame body **21** has a receiving space **211**, a top portion **214**, a bottom portion **215** and a shaft seat **22**. The receiving space **211** has a wind inlet side **212** and a wind outlet side **213** opposite to the wind inlet side **212**. The top portion **214** and the bottom portion **215** are disposed in adjacency to the wind inlet side **212** and the wind outlet side **213**, respectively. The bottom portion **215** comprises a stop backflow inclined surface **2151** which is upward obliquely extending from an edge of the bottom portion **215** of the frame body **21** toward the receiving space **211** below a plurality of blades **242**. The wind inlet side **212** and the wind outlet side **213** together define the receiving space **211** for receiving a fan impeller **24** therein. The fan impeller **24** has a hub **241**, an annularity portion **243** and multiple blades **242**

annularly arranged along outer circumference of the hub **241**. First ends of the blades **242** facing an inner circumference of the frame body **21** are not corresponding to the anti-relief sections **23**. The annularity portion **243** is positioned at the first ends of the blades **242** facing the inner circumference of the frame body **21** and away from the hub **241**. Furthermore, the stop backflow inclined surface **2151** upward obliquely extending from the edge of the bottom portion **215** of the frame body **21** toward the receiving space **211** is below the annularity portion **243**. The annularity portion **243** and the corresponding inner circumference of the frame body **21** together define a gap **26**. In operation of the fan impeller **24**, the external fluid is guided in from the wind inlet side **212** and pressurized and then guided out from the wind outlet side **213**.

The shaft seat **22** is disposed in the receiving space **211** in adjacency to the wind outlet side **213**. The shaft seat **22** has a base section **221** and a bearing cup **222** axially extending from the base section **221**. The fan impeller **24** is rotatably fitted in the bearing cup **222** to form a fan **2**. The frame body **21** further has multiple flow guide members **25**. In this embodiment, the flow guide members **25** are, but not limited to, fan blades for illustration purposes only. Alternatively, the flow guide members **25** can be ribs.

The flow guide members **25** are connected between the shaft seat **22** and inner circumference of the frame body **21**. The flow guide members **25** extend from a circumference of the base section **221** to the inner circumference of the frame body **21**. Each flow guide member **25** has a first connection end **251** and a second connection end **252**. The first connection end **251** is fixedly connected with the circumference of the base section **221**, while the second connection end **252** is fixedly connected with the inner circumference of the frame body **21**.

Please further refer to FIGS. **4** and **5**. The anti-relief sections **23** are disposed on the inner circumference of the frame body **21** between the flow guide members **25** and in adjacency to the wind outlet side **213**. Each anti-relief section **23** has a first end **231**, and a second end **232**, a flat surface **233** and a slant surface **234**. The first end **231** is integrally connected with the second connection end **252** of the adjacent flow guide member **25**. The second end **232** and the second connection end **252** of another opposite flow guide member **25** define therebetween an opening **26**. The slant surface **234** is flush and connected with the stop backflow inclined surface **2151**. The flat surface **233** of the anti-relief section **23** is below the blades **242**, namely, the flat surface **233** is facing the annularity portion **243** and the gap **26**. The width of the flat surface **233** of the anti-relief section **23** is larger or equal to that of the gap **26**.

In this embodiment, the anti-relief sections **23** are, but not limited to, integrally formed on the inner circumference of the frame body **21** by injection molding between the flow guide members **25** for illustration purposes only. In practice, alternatively, the anti-relief sections **23** can be separately formed members and connected to the inner circumference of the frame body **21** between the flow guide members **25** by means of adhesion or insertion. The anti-relief sections **23**, the flow guide members **25** and the frame body **21** together form an integral body.

Moreover, in practice, the anti-relief sections **23** can be designed with different configurations and sizes in accordance with the requirements in air volume anti-relief effect.

When the fan impeller **24** of the fan **2** operates, the external fluid is guided in from the wind inlet side **212** and pressurized and then guided out of the receiving space **211** from the wind outlet side **213** through the flow guide members **25**. At this time, a backflow of fluid **3** is produced on the wind outlet side **213**. The anti-relief sections **23** serve to stop the backflow of fluid **3** from flowing back to the wind inlet side **212** and guide out the backflow of fluid **3** from the wind outlet side **213**. Therefore, the backflow of fluid **3** will not interfere with the fluid guided in from the wind inlet side **212** so that the fluid can be smoothly guided into the fan **2** and guide out of the fan **2**. Accordingly, the anti-relief sections **23** can achieve an anti-relief effect to enhance the performance of the fan.

Please now refer to FIGS. **4** and **9**. FIG. **9** is a comparison diagram between air volume curve (also referred to as P (static pressure)-Q (air quantity) curve) of the present invention and air volume curve of the conventional fan. It can be seen from the diagram that the P-Q curve T**1** of the present invention with the anti-relief sections **23** is apparently higher than the P-Q curve T**2** of the conventional fan. That is, the air volume of the present invention is much higher than that of the conventional fan. Therefore, the air volume is effectively increased without changing any dynamic blade or static blade of the fan.

Please now refer to FIGS. **3**, **6**, **7** and **8**. FIG. **6** is a perspective view of a second embodiment of the present invention. FIG. **7** is a sectional assembled view of the second embodiment of the fan of the present invention. FIG. **8** is a perspective exploded view of the second embodiment of the fan of the present invention. The second embodiment is substantially identical to the first embodiment in structure and connection relationship and thus will not be repeatedly described hereinafter. The second embodiment is different from the first embodiment in that the first and second ends **231**, **232** of one anti-relief section **23** are respectively connected with the second connection ends **252** of each two adjacent flow guide members **25**. That is, the first end **231** of the anti-relief section **23** is connected with the second connection end **252** of one flow guide member **25**, while the second end **232** of the anti-relief section **23** is connected with the second connection end **252** of another flow guide member **25**. Accordingly, the anti-relief sections **23** are integrally connected with the second connection ends **252** of the flow guide members **25** to form an annular body.

The annular body composed of the anti-relief sections **23** serves to stop the backflow of fluid **3** from flowing back to the wind inlet side **212** so as to achieve an excellent anti-relief effect to effectively enhance the performance of the fan.

In conclusion, in comparison with the conventional fan, the present invention has the following advantages:

1. The present invention is able to provide anti-relief effect.

2. The present invention is able to increase the performance of the fan.

The above embodiments are only used to illustrate the present invention, not intended to limit the scope thereof. It is understood that many changes and modifications of the above embodiments can be made without departing from the spirit of the present invention. The scope of the present invention is limited only by the appended claims.

What is claimed is:

1. An anti-relief fan frame body structure comprising:

a frame body having a receiving space, a top portion, a bottom portion and a shaft seat received in the receiving space, the receiving space having a wind inlet side and a wind outlet side opposite to the wind inlet side, the wind inlet side and the wind outlet side together defining the receiving space, the top portion and the bottom portion being in adjacency to the wind inlet side and the wind outlet side, respectively, the bottom portion comprising a stop backflow inclined surface, the shaft seat being in adjacency to the wind outlet side and having a base

section and a bearing cup, the bearing cup being axially extending from the base section for rotatably fitting with a fan impeller with a plurality blades, the frame body further having multiple flow guide members extending from a circumference of shaft seat to an inner circumference of the frame body to connect with the inner circumference of the frame body; and

multiple anti-relief sections disposed on the inner circumference of the frame body between the flow guide members and comprising a flat surface and a slant surface, the flat surface below the blades of the fan impeller, the slant surface being connected with the stop backflow inclined surface; and

wherein the stop backflow inclined surface is upward obliquely extending from an edge of the bottom portion of the frame body toward the receiving space below the blades; and

wherein ends of the blades facing the inner circumference of the frame body do not correspond to the anti-relief sections, and the anti-relief sections are positioned under the blades.

2. The anti-relief fan frame body structure as claimed in claim **1**, wherein the flow guide members are connected between the shaft seat and the inner circumference of the frame body, each flow guide member having a first connection end and a second connection end outward extending from the first connection end, the first connection end being fixedly connected with a circumference of the base section, while the second connection end being fixedly connected with the inner circumference of the frame body.

3. The anti-relief fan frame body structure as claimed in claim **2**, wherein each anti-relief section has a first end and a second end, the first end being connected with the second connection end of an adjacent flow guide member, the second end and the second connection end of another opposite flow guide member defining therebetween an opening.

4. The anti-relief fan frame body structure as claimed in claim **1**, wherein the anti-relief sections are integrally formed on the inner circumference of the frame body by injection molding between the flow guide members.

5. The anti-relief fan frame body structure as claimed in claim **2**, wherein each anti-relief section has a first end and a second end, the first and second ends of one anti-relief section being respectively connected with the second connection ends of each two adjacent flow guide members to form an annular body.

6. The anti-relief fan frame body structure as claimed in claim **1**, wherein the flow guide members are fan blades or ribs.

7. The anti-relief fan frame body structure as claimed in claim **1**, wherein the anti-relief sections are connected to the inner circumference of the frame body between the flow guide members by means of adhesion or insertion.

8. The anti-relief fan frame body as claimed in claim **1**, wherein the fan impeller further comprises a hub and an annularity portion, the plurality of blades being annularly arranged along an outer circumference of the hub, the annularity portion being positioned at the first ends of the blades away from the hub, the annularity portion and the inner circumference of the frame body together defining a gap which having a width smaller than or equal to that of the flat surface of the anti-relief section.

9. The anti-relief fan frame body as claimed in claim **8**, wherein the stop backflow inclined surface is upward obliquely extending from an edge of the bottom portion of the frame body toward the receiving space below the annularity portion of the fan impeller, and the flat surface of the anti-relief section is facing the annularity portion and the gap.

10. The anti-relief fan frame body structure as claimed in claim **9**, the anti-relief section comprises a flat surface and a slant surface, the flat surface being corresponding to the annularity portion and the gap, and the slant surface being flush and connected with the stop backflow inclined surface.

* * * * *